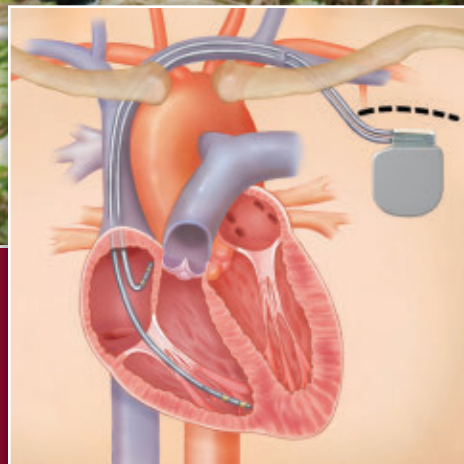


# IMPLANTABLE CARDIOVERTER DEFIBRILLATORS (ICDs)



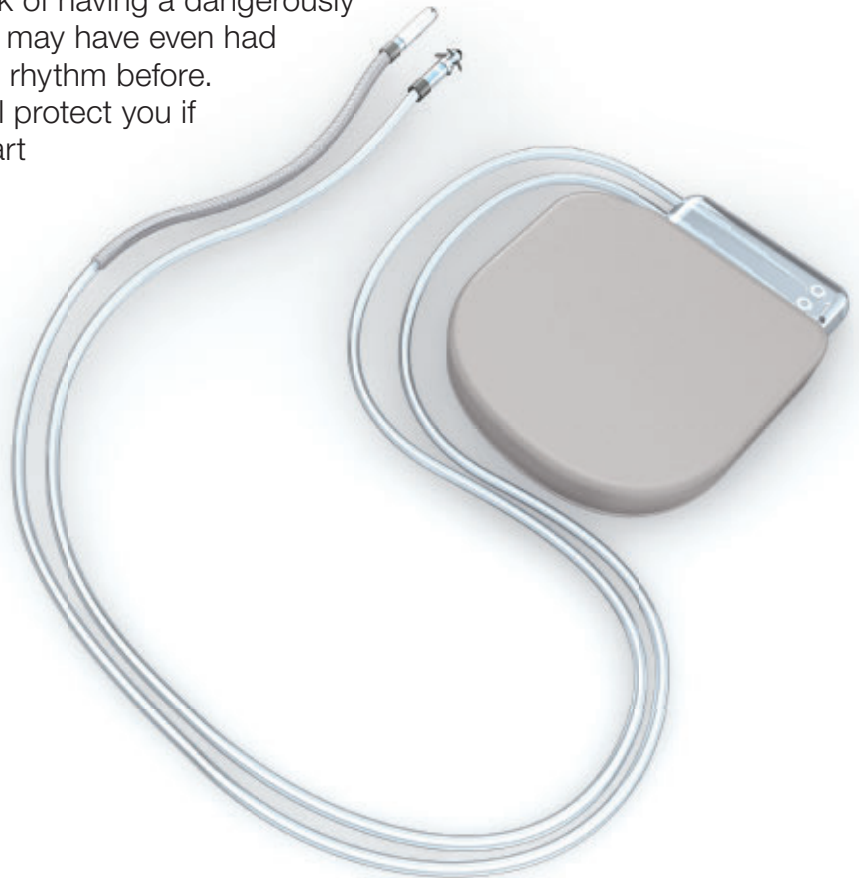
Living Well with an ICD

# An ICD Could Save Your Life

Your heart has an electrical system that keeps it beating at the right speed. Problems with this system can sometimes make it beat very quickly. A very fast heart rhythm can be dangerous—even deadly. Your doctor is recommending an **ICD (implantable cardioverter defibrillator)** for you. This device can stop a fast rhythm and save your life. Read this booklet to learn more about what an ICD can do for you.

## What Is an ICD?

An ICD is a small electronic device that's placed permanently inside the body. The device monitors the heart's rhythm (the speed and pattern of the heartbeat). If this rhythm becomes too fast, too slow, or irregular, the ICD sends out electrical signals that help bring the rhythm back to normal. Your doctor has suggested an ICD because you are at risk of having a dangerously fast heart rhythm. You may have even had a life-threatening heart rhythm before. Either way, the ICD will protect you if a dangerously fast heart rhythm develops.





## Your Role

An ICD will protect you from a dangerous heart rhythm. But having one is a lifelong commitment. Work with your doctor to decide whether an ICD is right for you. Know what you will need to do to care for the device and how often it needs to be checked and monitored. Be sure to mention concerns and get answers to any questions you have. By being informed, you can help your doctor ensure you get the care you need.

# The Heart's Electrical System

**Your heart pumps blood throughout your body. The heart's electrical system tells it when to pump. If this system develops a problem, the heartbeat can become too fast. As a result, the heart may not pump as it's supposed to. A heartbeat that's too fast can be serious, even deadly.**

## The Heart Pumps Blood

The heart is a muscle. By contracting (squeezing), it pumps blood to all parts of the body. The heart is divided into four chambers. The two upper chambers are called **atria**. These fill with blood entering the heart. The atria contract to move blood into the two lower chambers, called **ventricles**. The ventricles contract to pump blood out of the heart.

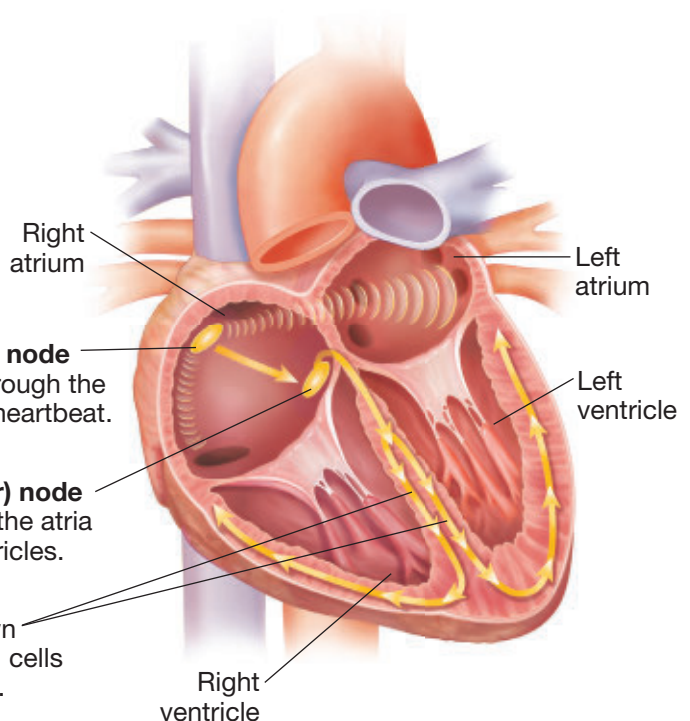
## How the Electrical System Works

The heart's electrical system tells the chambers when to contract and relax. Groups of electrical cells in the right atrium send out the signals that start each heartbeat. These signals travel to the ventricles along pathways of electrical cells.

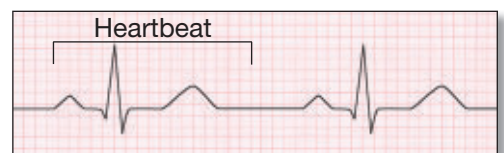
**The SA (sinoatrial, or sinus) node** sends a signal that travels through the atria. This signal starts each heartbeat.

**The AV (atrioventricular) node** receives the signal from the atria and guides it to the ventricles.

The signal travels down **pathways** of electrical cells and into the ventricles.



**During a normal heartbeat**, electrical signals are organized and sent out at a constant speed. An electrocardiogram (ECG or EKG) records the heart's electrical signals (as shown on the readout at right).



Normal heart rhythm is called **sinus rhythm**.  
A normal resting heart rate is 60 to 100 beats per minute (bpm).



## Problems with Electrical Signals

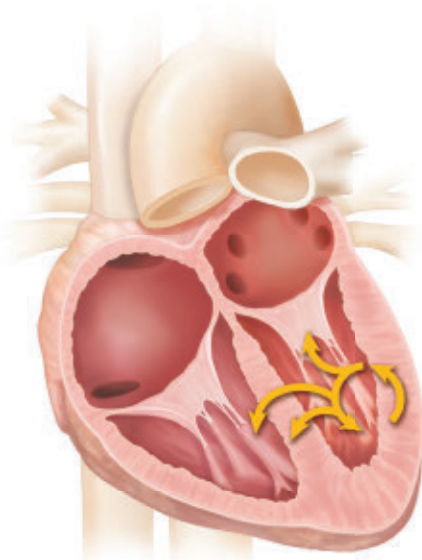
A problem with the heart rhythm is called an **arrhythmia**. Certain arrhythmias that affect the ventricles can be very serious. If not treated right away, they can progress to **cardiac arrest**. With cardiac arrest, no blood is being pumped out of the heart. A person in cardiac arrest will become unconscious. Emergency treatment must be done to get the heart pumping correctly again or the person will die. Treatment involves sending an electrical shock to the heart. This stops the heartbeat, allowing it to return to a normal rhythm. Two types of dangerous heart rhythms are explained below.

### Ventricular Tachycardia (VT or “v-tach”)

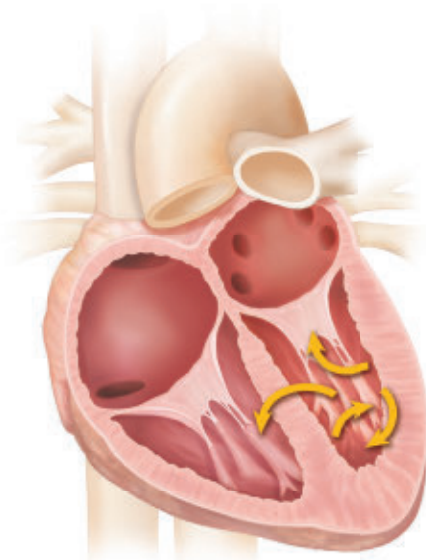
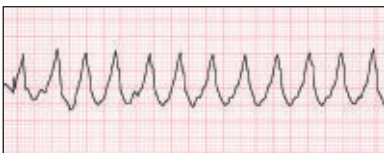
During VT, the ventricles contract too quickly. This is often caused by extra signals that start in the ventricles instead of the atria. With VT, the ventricles beat so fast they don’t have time to fill with blood. If not treated, VT can be life-threatening. It can also progress to VF.

### Ventricular Fibrillation (VF or “v-fib”)

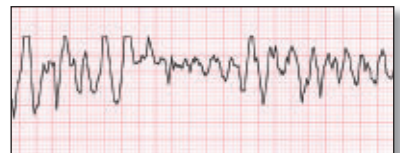
During VF, electrical signals are very fast and also irregular. The contractions of the ventricles can be so fast and disorganized that the heart muscle quivers rather than pumps. This causes cardiac arrest. If VF is not treated right away, it is almost always fatal.



**During VT,**  
the heartbeat  
is very fast,  
but still  
regular.



**During VF,**  
the heartbeat  
is very fast  
and irregular.

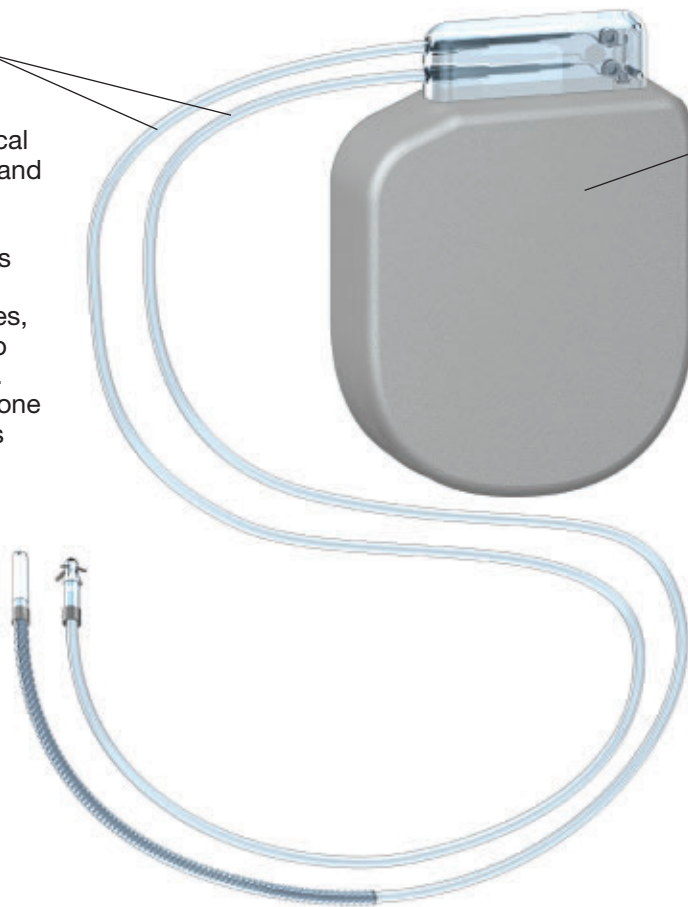


# How an ICD Works

**An ICD can sense when your heart rhythm becomes dangerously fast. The ICD will then send electrical impulses or a brief shock to return the heart rhythm to normal. There are different types of ICDs. Your doctor will choose the type of ICD that's best for you.**

## Parts of an ICD

**Leads** are wires covered by soft, flexible material. They carry electrical information back and forth between the heart and the generator. All ICDs have at least one lead. In most cases, this lead goes into the right ventricle. Some ICDs have one or two more leads going into other chambers.



**The generator** is a smooth, lightweight metal case. It holds a tiny computer and a battery. The generator keeps track of your heart rhythm and sends out electrical impulses or a shock as needed.

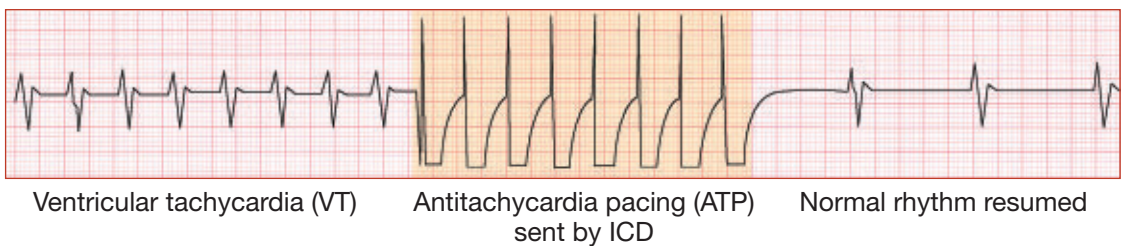
## Subcutaneous ICD

In certain circumstances, a subcutaneous ICD may be used. With this ICD, the generator is put under the skin on the side of the chest. A single lead is put under the skin along the breastbone to the heart. The lead remains outside the heart. This type of ICD is not right for everyone. If it is a good option for you, your doctor can tell you more.

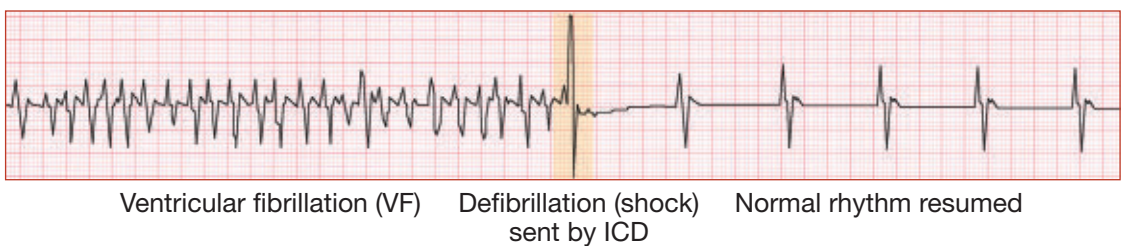
## What an ICD Does

- **Pace a fast heart:** If the ICD senses the heart beating too fast, it sends a series of impulses to return the rhythm to normal. This is called antitachycardia pacing (ATP). This is painless and often not noticeable.
- **Shock the heart:** If the heartbeat becomes too fast, the ICD may use cardioversion (several light shocks) or defibrillation (one strong shock) to stop the heartbeat. When the heart starts beating again, it's usually in a normal rhythm. A strong shock may feel like a kick to the chest.
- **Pace a slow heart:** In some cases, the heart might also beat too slowly at times. The ICD sends out impulses that keep the heart beating at a minimum pace.

### ATP



### Defibrillation



## If You Have Heart Failure

If you have heart failure and are at risk for a life-threatening heart rhythm, a special kind of ICD may be used. This ICD has leads in both ventricles. In addition to treating fast heart rhythms, the device synchronizes the beating of the ventricles. This treatment is called cardiac resynchronization therapy (CRT). If this type of ICD would benefit you, your doctor can tell you more.

# The Implantation Procedure

**The ICD is put into your body during a process called **implantation**. It's a relatively minor procedure done in an operating room or cardiac catheterization lab. An ICD can be implanted in either side of the chest but is most often placed on the left side. The procedure usually takes 1 to 3 hours.**

## Getting Ready for the Procedure

- Have tests that your doctor recommends.
- Tell your doctor about all prescribed medications you take. Be sure to mention medications to prevent blood clots. These include daily aspirin and drugs such as warfarin. Also be sure to mention diabetes medications such as insulin. You may be given special instructions for these.
- Also tell your doctor about all over-the-counter medications, herbal remedies, or supplements you use. Mention if you take pain relievers, such as NSAIDs.
- Tell your doctor if you're pregnant (or think you could be).
- Don't eat or drink anything as instructed before your procedure.

## Before Implantation

- You will be asked your name and procedure more than once. This is for your safety.
- An IV is put into your hand or arm to provide fluids and medication. You may be given medication to help you relax.
- Anesthesia is given to prevent pain and make you sleep during the procedure. You may be relaxed and drowsy (conscious sedation) or in a state like deep sleep (general anesthesia).

▶▶ You will be asked to sign forms giving your consent for the procedure. Be sure to have all your questions answered before you sign.



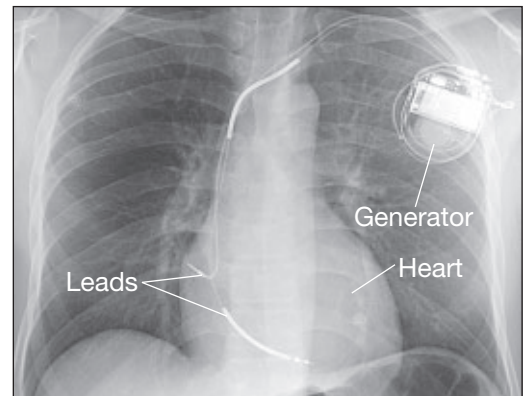
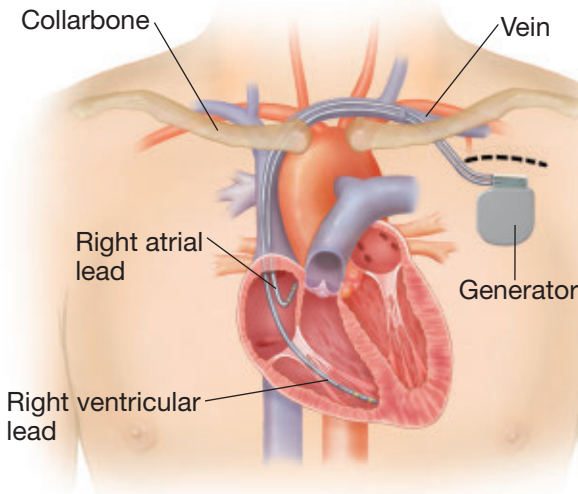
If needed, the generator can be placed in the abdomen.  
If this is better for you, your doctor will tell you more.



## During the Procedure

The ICD is usually implanted on the left side of the chest. Implantation does not require open heart surgery (your chest will not be opened). During implantation:

- **An incision is made** beneath the collarbone. A small “pocket” for the generator is created.
- **A lead is guided through a vein** into your heart. An x-ray monitor helps your doctor guide the lead into place. This is repeated for each lead.
- **The lead or leads are attached to the heart muscle** using small anchors on the tips of the leads. Electrical measurements are done to find the best placement.
- **The generator is attached to the leads** and placed in the pocket under your skin.
- **The ICD may be tested** by inducing and correcting a fast heart rhythm.
- **The incision is closed.** You’re then taken to a recovery area.



X-ray showing an implanted ICD

## Risks and Complications

*Like any procedure, ICD implantation has risks. These include:*

- Bleeding or blood clots
- Infection
- Severe bruising or swelling at the incision site
- Puncture of the lung or heart muscle
- Tearing of the vein or artery wall
- Need to have leads or generator repositioned or replaced
- Heart attack, stroke, or death



# After the Procedure

**You will likely stay in the hospital overnight. Before going home, you'll be given instructions for how to care for yourself. If you have questions, ask the doctor or nurse. At home, follow the instructions you've been given for recovery.**

## In the Hospital

After the procedure, nurses will monitor your heart signals and check your incision. They can also provide medications for pain. Be sure to tell the nurses if you have any chest pain, shortness of breath, twitching, or hiccups. Once you're stable, you'll be moved to a hospital room. There, your ICD's functions and settings may be checked. You'll also have a chest x-ray. You can go home once your doctor says it's okay. Have an adult family member or friend ready to drive you.

## Recovering at Home

- You may be told to restrict how high you raise the arm on the side where the ICD was implanted. Don't stop using the arm or shoulder completely. You can go back to normal use in time.
- You may have bruising at the incision site for about a month. This is normal. It will go away as the incision heals.
- It's normal to have some pain and stiffness around your incision for a few days. Over-the-counter pain medications can often help. If needed, your doctor may also prescribe pain medications.
- You can often get back to your normal routine soon after implantation. Ask your doctor when you can return to work.



▶▶ To avoid raising your arm above shoulder level, ask for help reaching items on high shelves.

## ICDs and Driving

Many states have laws about ICDs and driving. In general, you will likely be told not to drive for at least a week after having the ICD implanted. If the ICD gives a shock to stop VT or VF, you may be told to avoid driving for several months. Your doctor can tell you more about the laws in your state.

## Caring for Your Incision

- Change or remove the dressing as instructed.
- Keep the incision clean and dry. You may be told to take sponge baths at first. You can begin showering when your doctor says it's okay.
- Don't scrub the incision as you bathe. Also, don't let water spray directly on the incision.
- Pat the incision dry. Don't use lotion, ointment, or powder on the incision while it heals.
- Call your doctor if you notice any changes in the incision, such as signs of infection (see "When to Call Your Doctor" below).



►► Care for your incision as instructed by your healthcare provider.

## Following Up

Return for follow-up visits as instructed. Your incision may be checked. You may also have the ICD settings checked to be sure they are right for you.

## When to Call the Doctor

*Call if you have any of the following after the procedure:*

- Signs of infection at the incision site, such as increasing redness, swelling, warmth, or drainage
- Fever of 100.4°F (38°C) or higher
- Pain around your ICD that gets worse, not better
- Chest pain or shortness of breath
- Bleeding or severe swelling of the incision site (bulging up like a golf ball)
- Swelling in the arm or hand on the side of the incision site
- Twitching chest or abdominal muscles
- Frequent or constant hiccups



# Checking Your ICD

**Your ICD needs to be checked about every 3 to 6 months. This allows your healthcare provider to review your heart's electrical activity and any impulses or shocks the ICD has sent out. The battery and leads are also checked. Your ICD can be checked in person during follow-up visits. It can also be monitored from home.**

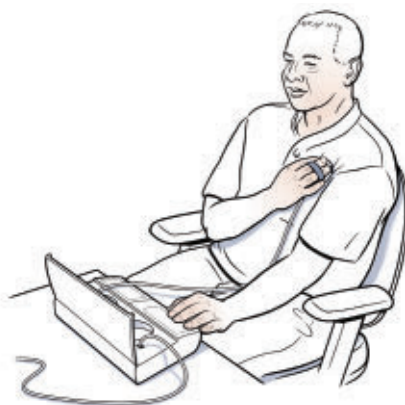
## Making Adjustments

During follow-up visits, your healthcare provider reviews the information stored on the ICD's computer. This helps ensure the ICD is working well. At some visits, settings may be adjusted. This is done from outside the body. A device called a programmer is used to read the ICD's memory and change settings as needed.



## Checking the ICD from Home

You may be able to have your ICD checked from home. This is done using a special monitor that sends the ICD's signals wirelessly or over the phone line. Your healthcare provider reviews the information and decides if you need to come in for an adjustment.



## Replacing the Battery or Leads

Most ICD batteries last about 3 to 7 years. The battery level is checked during follow-up visits. Some ICDs have alarms that sound or vibrate when the battery is low. Even if the alarm goes off, there is still plenty of time to replace the battery before it wears out. To replace the battery, the entire generator is replaced. This procedure is usually simpler and shorter than the first ICD implantation. In rare cases, leads need to be replaced. This is done during a procedure similar to the first implantation.

# Living with an ICD

**Most machines and devices will NOT interfere with your ICD. However, certain precautions are needed. If you're not sure what is safe, ask your doctor or call the manufacturer. If a signal does interfere, the ICD can turn off or reset. You may even get a shock. If you think there has been interference, call your doctor and explain what happened.**

## What to Know About Outside Signals

Microwave ovens and other appliances should not cause problems. Neither should computers, hair dryers, power tools, radios, televisions, electric blankets, or riding in cars. But precautions are needed around certain devices. To protect your ICD, follow the advice below.

- **A cellphone** will probably not affect your ICD. To be safe, carry a cellphone on the side opposite your ICD and at least 6 inches away from it. While using a cellphone, wear a headset or hold the phone to the ear opposite your ICD.
- **Electromagnetic antitheft systems** are often near entrances or exits in stores. Walking through one is okay. However, avoid standing near or leaning against one.
- **Strong electrical fields** can be caused by radio transmitting towers and heavy-duty electrical equipment (such as arc welders). A running engine also produces an electrical field. Avoid leaning over the open hood of a running car.
- **Very strong magnets** should be avoided. These include those in big speakers (such as those at concerts) and in handheld security wands. Talk to your doctor before scheduling an MRI (a test that uses strong magnets).

## Carry an ID Card

Always carry the ID card you are given that says you have an ICD. Show this card to any doctor, dentist, or other medical professional you visit. Also show it to guards who do security screening at the airport and in other places. Ask them not to use a handheld metal detector on you.



# If You Have an Event

**An event is the name for what happens when the ICD sends signals or shocks. If you never have an event, this doesn't mean the ICD isn't doing its job—just that you haven't needed it. As long as you don't have symptoms, it's fine if you never get a shock. If you do have an event, though, this page will help you know what to do.**

## What Will It Feel Like?

Antitachycardia pacing can feel like small flutters or like nothing at all. But if the ICD shocks you, you'll feel it. The shock may feel as strong as a kick to the chest. It hurts, but it will be over before you know it.

## What You Should Do

If you feel okay after the event, just let your healthcare provider know what happened. This is not an emergency, so call during business hours. Your doctor may want to check the ICD to make sure the shock was sent in response to VT or VF. If it was not, the ICD's settings can be adjusted to keep this from happening again.



## When to Call 911 (Emergency)

*If you have one or two shocks and feel okay afterward, you don't need to call 911. Instead, call your doctor's office during business hours. **Do call 911 if:***

- You feel chest pain or symptoms of a fast heart rhythm (such as palpitations, dizziness, shortness of breath, chest discomfort) after a shock.
- You feel more than two shocks in a row.
- You have symptoms of a fast heart rhythm and feel no shock.
- You are unconscious, even briefly (someone should call 911 for you).



# Addressing Your Feelings

**It's normal to have fears and strong feelings about getting an ICD. Knowing you're at risk of a dangerous heart rhythm can be scary. And some people are nervous about getting a shock. Remember: The ICD is meant to help you live longer. You may never have a life-threatening heart rhythm. But if you do, the ICD will treat the rhythm—and will most likely save your life.**

## Things to Remember

Having an ICD won't stop you from doing most of what you want to do. It may even help you feel more confident about your heart and your health. If you're worried about the ICD or getting a shock, keep the following in mind:

- The ICD can tell the difference between a fast heart rate due to activity and a life-threatening rhythm. So having an ICD won't stop you from exercising or doing most other physical activities. For the same reason, it won't stop you from having sex or being intimate.
- If your ICD ever goes off during physical activity, stop and call your healthcare provider. If the shock was accidental, the ICD's settings can most likely be adjusted to keep this from happening again.
- You can wear a medical ID bracelet that says you have an ICD. This can help you feel secure that you will get help if you have an event and cannot communicate.
- Your ICD will not hurt or affect people around you, even if they are touching you when it goes off.



## Coping with Depression and Anxiety

Feelings of depression and anxiety are very common after being diagnosed with a heart problem. If you're having these feelings, help is available. Talk to your doctor about how you feel. If needed, ask for a referral to a therapist. Also consider joining a support group. This way, you can get support from others who are in a similar situation and may share your feelings.



## Work with Your Doctor

An ICD is not a cure for heart rhythm problems. You'll likely still need medications and other forms of treatment. But you can feel confident that your ICD will protect you from a life-threatening heart rhythm. For the best outcome, work with your doctor. Mention any concerns you have. And keep your follow up appointments to ensure your ICD continues to protect you. This way, you can worry less about your heart and focus on living your life.

## For More Information

To learn more about ICDs and heart rhythm problems, try these resources:

- **American Heart Association**  
[heart.org](http://heart.org) 800-242-8721
- **Heart Rhythm Society**  
[www.hrspatients.org](http://www.hrspatients.org)

Also available in Spanish

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